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(54) Title: REFERENCING WEB PAGES BY CATEGORIES FOR VOICE NAVIGATION
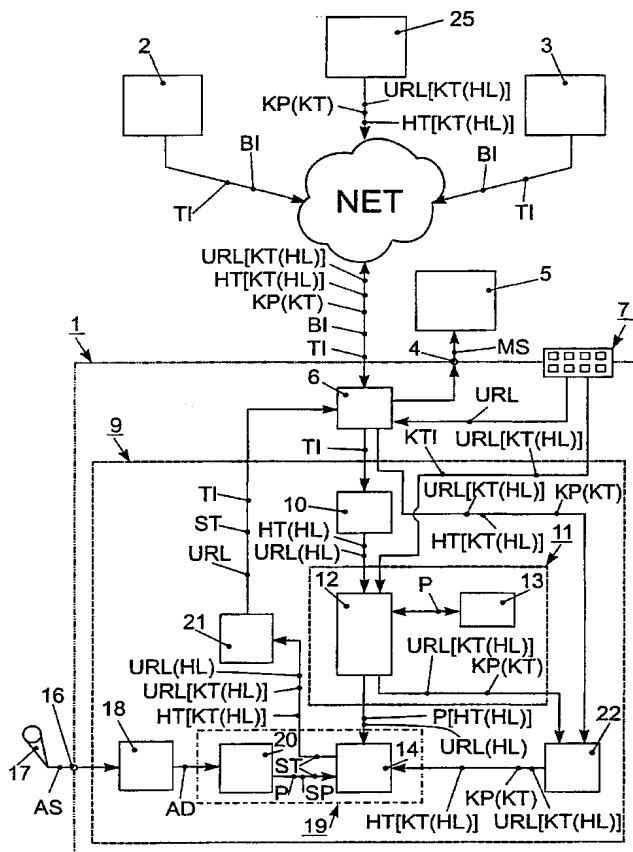
(57) Abstract: In a speech recognition method of selecting Internet addresses (URL[KT(HL)]) of Internet pages (8) assigned to a search criterion (KT) the method comprises the following steps: receiving (18) a spoken command (AS) of a user which represents a search command and a search criterion (KT), and determining a search phoneme sequence (SP) corresponding to the search criterion (KT) of the spoken command (AS) and determining a search criterion phoneme sequence (KP(KT)) that has a sufficiently large correspondence to the search phoneme sequence (SP) from stored (22; 25) search criterion phoneme sequences (KP(KT)) of search criterions (KT) and determining (14) at least one stored Internet address (URL[KT(HL)]) of at least one Internet page assigned to the search criterion (KT) assigned to the determined search criterion phoneme sequence (KP(KT)) and displaying this at least one assigned Internet page.

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REFERENCING WEB PAGES BY CATEGORIES
FOR VOICE NAVIGATION

The invention relates to a speech recognition method of selecting Internet addresses of Internet pages assigned to a search criterion, to a computer program product in accordance with the introductory part of claim 8 and to a selection method of selecting Internet addresses of Internet pages assigned to a search criterion.

Such a speech recognition method, such a selection method and such a computer program product is known from the speech recognition software "Free Speech Browser", which has been marketed by Philips since mid-November 1999. When the known speech recognition software is loaded into an internal memory of the computer and is processed by the computer, the known speech recognition method is executed. When this computer further processes the software of the so-called Internet browser (for example, "Microsoft Explorer" by Microsoft) and the computer is connected to the Internet, a user of the computer can select by commands spoken into a microphone Internet pages which are then displayed on a monitor of the computer.

To achieve this the user of the computer speaks an Internet address into the microphone, after which the text information of the Internet address recognized via the speech recognition method is delivered to the Internet browser. Then the Internet browser scans the Internet page of the respective computer server connected to the Internet featured by this Internet address and displays this Internet page on the monitor.

If a user liked to search for Internet pages containing information about a certain search criterion – such as, for example, books of motorcars - the user is to proceed in accordance with the known speech recognition method of selecting Internet pages as follows. The user speaks the Internet address of a so-called search engine – such as, for example, YAHOO or ALTAVISTA – into the microphone and waits for the search engine to be displayed on the monitor. Subsequently, the user speaks the search criterion into the microphone, which is recognized in accordance with the speech recognition method and is inserted into an entry field of the Internet page of the search engine. Finally, the user speaks the search command "SEARCH" into the microphone to activate the search procedure of the

search engine. As a result of the search the user receives a survey Internet page with hyperlinks to Internet pages on the monitor, which pages contain information about the entered search criterion.

With the known speech recognition method and selection method of selecting Internet pages the disadvantage has appeared that the user is to speak certain information or commands into the microphone three times at specific instants until, after a relatively long period of time, the result of the search is displayed on the monitor.

It is an object of the invention to eliminate the problems defined above and provide an improved speech recognition method, an improved selection method and an improved computer program product. These objects are achieved with such a speech recognition method by the measures of claim 1, with such a computer program product with the measures of the characterizing part of claim 8 and with such a selection method with the measures of claim 10.

As a result, a user can, for example, speak the command "search" and then a search criterion into the microphone and a search phoneme sequence will be determined for this search criterion in accordance with the speech recognition method. The search phoneme sequence is compared to a number of stored search criterion phoneme sequences of search criterions for which at least one Internet address of an Internet page is assignedly stored which page contains the information corresponding to the search criterion. If one of the stored search criterion phoneme sequences sufficiently corresponds to the determined search criterion phoneme sequence, the Internet page of the Internet address assigned to this search criterion phoneme sequence is displayed on the monitor.

This offers the advantage that a user needs to speak a command into the microphone only once to immediately obtain an Internet page with information about the search criterion on the monitor. Particularly advantageous is the fact that the creator of the database, which contains the stored search criterion phoneme sequences and stored Internet addresses, can ask for registration fee from persons or companies whose Internet address is to be entered in a database under a search criterion. In this manner the speech recognition method as claimed in claim 1 reveals, in addition to technical measures according to the invention, an economically interesting new method of running businesses on the Internet.

With the speech recognition method as claimed in claim 1 it has proved to be advantageous to provide the measure as claimed in claim 2. This achieves that when more

than one Internet address for a search criterion phoneme sequence is stored in the database, an Internet index page with hypertexts of hyperlinks to Internet pages is shown which pages contain information to the search criterion. As a result, the user, by activating the hyperlink of the Internet index page, can have one Internet page after the other with information about the search criterion shown on the monitor.

With the speech recognition method as claimed in claim 1 it has proved to be advantageous to provide the measures as claimed in claim 3. As a result, the database stored in a computer server connected to the Internet and continuously updated containing Internet addresses and search criterions is retrieved after long or short time distances by the computer which executes the speech recognition method and stored by the computer. This advantageously achieves, on the one hand, that the result of a search is displayed on the monitor very fast and, on the other hand, always topical data are processed.

With the speech recognition method as claimed in claim 1 it has proved to be advantageous to provide the measures as claimed in claim 4. A user himself can then enter a search criterion as search criterion text information and one or more Internet addresses with information about the search criterion via a keyboard of the computer. Subsequently, a search criterion phoneme sequence corresponding to the entered search criterion text information is detected and stored assigned to the entered Internet address(es) in the database. The thus updated database can be stored with the computer, but also be conveyed to the computer server over the Internet to update the database stored in the computer server.

This advantageously achieves that a user can enter his own search criterions and associated Internet addresses in which a search can be made by speaking a special search command (for example "MY"), which will be further discussed with reference to the example of embodiment.

With the speech recognition method as claimed in claim 1 it has proved to be advantageous to provide the measures as claimed in claim 5. They achieve, when a search criterion is entered as a spoken command whose search criterion phoneme sequence is not stored in the database, that search text information is determined for the search criterion and delivered to a computer server which forms a search engine such as, for example, "YAHOO". The result of the search engine is then displayed by the monitor as this was described above.

With the speech recognition method as claimed in claim 1 it has proved to be advantageous to provide the measures as claimed in claim 6. They provide that a search phoneme sequence associated to a search criterion is delivered to the Internet server, which stores the database with Internet addresses and search criterion phoneme sequences. The

Internet server then compares the received search phoneme sequence with stored search

criterion phoneme sequences and the result of the search is then delivered to the user's

computer via the Internet and displayed on the monitor.

With the speech recognition method as claimed in claim 1 it has proved to be

5   advantageous to provide the measures as claimed in claim 7. They can help the user decide,

by selecting the search command, which of the search criterion phoneme sequences stored in

the database are to be compared with the search phoneme sequence.

With a computer program product as claimed in claim 8 it has proved to be

advantageous to store this product on a medium that can be read by a computer so as to

10   simplify transportation and installation of the computer program product.

The invention will be described with reference to five examples of application

of a first example of embodiment shown in the Figures and with reference to a second

15   example of embodiment to which, however, the invention is not restricted.

Fig. 1 diagrammatically shows in the form of a block diagram a computer

connected to the Internet by which a speech recognition method is executed for selecting

Internet addresses from Internet pages assigned to a search criterion,

Fig. 2 shows text information and picture information of an Internet page

20   displayed on a monitor,

Fig. 3 shows a command table stored in a command determining stage of the

computer shown in Fig. 1,

Fig. 4 shows a first search table stored in search storage means of the

computer shown in Fig. 1,

25   Fig. 5 shows a second search table stored in the search storage means of the

computer shown in Fig. 1,

Fig. 6 shows an Internet index page displayed on the monitor, and

Fig. 7 shows a second search table shown in Fig. 5 with a further search

criterion and an associated Internet address entered in the second search table.

30   ·

Fig. 1 diagrammatically shows in the form of a block diagram a computer 1, a

first computer server 2 and a second computer server 3, which are all connected to the

Internet NET. To the monitor port 4 of the computer 1 is connected a monitor 5 by which

picture information BI and text information TI of an Internet page can be displayed. A

monitor signal MS containing picture information BI and text information TI can be

delivered through the monitor port 4 of the computer 1 to the monitor 5.

In an internal memory of the computer 1 can be loaded a first computer

5   program product which, when running on the computer 1, forms a so-called Internet browser

6. The first computer program product contains software code sections and may be formed,

for example, by the known computer software "Microsoft Explorer" of Microsoft or, for

example, by the known computer software "Netscape Navigator" of Netscape.

An Internet address URL can be applied to the Internet browser 6 via a

10   keyboard 7 and the Internet browser 6 is then arranged for searching for the computer server

2 or 3 connected to the Internet NET and featured by the Internet address URL. Once the

sought computer server 2 or 3 has been found, the Internet browser 6 scans and receives the

Internet page featured by the Internet address URL and stored with a computer server 2 or 3,

which page usually contains text information TI and picture information BI and is HTML

15   coded. The Internet browser 6, after receiving the text information TI and picture information

BI of an Internet page, delivers this monitor signal MS containing this information to the

monitor port 4.

In Fig. 2 is shown an Internet page 8, which can be displayed or reproduced

respectively by the monitor 5. The Internet page 8 contains text information TI1 and TI2 as

20   well as picture information BI1 and BI2. The Internet page 8 contains further text

information TI3, TI4, TI5, TI6 and TI7, which are shown underlined and form hypertexts

HT(HL) of so-called hyperlinks HL. Each hyperlink contains both a hypertext HT(HL) and

an Internet address URL(HL) of the hyperlink HL assigned to the hypertext HT(HL) which,

however, is not displayed by the monitor 5.

25   When a user of the computer 1 – for example by actuating keys of the keypad

7 – selects one of the represented hypertexts TI3 to TI7 and thus activates the hyperlink HL,

the Internet browser 6 loads text information TI and picture information BI of the Internet

page featured by the Internet address URL(HL) of the activated hyperlink HL, as this was

described above.

30   In the internal memory of the computer 1 can further be stored a second

computer program product which, when it runs on the computer 1, forms a speech

recognition device 9, as the result of which the computer 1 executes a speech recognition

method. The speech recognition device 9 is arranged for controlling the Internet browser 6.

For this purpose, the speech recognition device 9 is arranged for delivering the Internet address URL of an Internet page selected by a user of the computer 1 via a spoken command.

The speech recognition device 9 has hyperlink identification means 10. To the hyperlink identification means 10 can be applied text information TI of the Internet page 8 displayed by the monitor 5 and detected by the Internet browser 6. The hyperlink identification means 10 are arranged for detecting the text information TI3 to TI7 of hypertexts HT(HL) of the hyperlink HL from the text information TI of the received Internet page 8. This text information TI3 to TI7 can be delivered as hypertexts HT(HL) of the hyperlink HL of the Internet page 8 by the hyperlink identification means 10.

The hyperlink identification means 10 are further arranged for detecting the Internet addresses URL(HL) of the hyperlink HL – not shown in Fig. 2 – from the text information TI of the received Internet page 8. To each hypertext HT(HL) of a hyperlink HL that can be produced by the hyperlink identification means 10 can be assigned an Internet address URL(HL) of the hyperlink HL.

The speech recognition device 9 further includes correlation means 11 for determining first phoneme sequences PI1[HT(HL)] corresponding to these hypertexts HT(HL). For this purpose the correlation means 11 include a correlation stage 12 and a word memory 13. In the word memory 13 are stored 64,000 words in English as a so-called background lexicon. Stored in the word memory 13 and assigned to each of these words is a phoneme sequence PI, which corresponds to the acoustic pronunciation of this word.

The correlation stage 12 is arranged for determining a first phoneme sequence PI1[HT(HL)] for each hypertext HT(HL) of a hyperlink HL delivered to the correlation stage 12 by the hyperlink identification means 10. The correlation stage 12 is then arranged for comparing text portions of the hypertext HT(HL) of a hyperlink HL with words stored in the word memory 13. When a large degree of correspondence has been detected between a text portion of the hypertext HT(HL) of the hyperlink HL and a word of the word memory 13, the phoneme sequence PI assigned to this word and stored in the word memory 13 is incorporated in the first phoneme sequence PI1[HT(HL)] of this hypertext HT(HL).

The speech recognition device 9 further includes a command determining stage 14 by which a command table 15 shown in Fig. 3 is stored. In a first column of the command table 15 are stored the first phoneme sequences PI1[HT(HL)] determined by the correlation stage 12 and delivered to the command determining stage 14. In a third column of the command table 15 are stored the Internet addresses URL(HL) of the hyperlink HL

detected by the hyperlink identification means 10 and delivered to the command determining stage 14 by the correlation stage 12.

This achieves that in the command table 15 of the command determining stage 14 are stored first phoneme sequences PI1[HT(HL)] and Internet addresses URL(HL) for each hyperlink HL of the Internet page 8 displayed by the monitor 5. The hypertexts HT(HL) of the phoneme sequences PI1[HT(HL)] stored in the command determining stage 14 form the spoken commands that can be recognized by the speech recognition device 9 when the Internet page 8 is displayed by the monitor 5. In addition, the speech recognition device 9 also recognizes search commands and subsequent search criterions in spoken commands, which will be further discussed hereinbelow.

The computer 1 has an audio port 16 to which a microphone 17 can be connected to the computer 1. A user of the computer 1 can speak a command into the microphone 17, after which an audio signal AS corresponding to the command is delivered to the audio port 16 by the microphone 17. For activating a hyperlink HL the user can speak a part of or also the whole text information TI3, TI4, TI5, TI6 or TI7 of a hypertext HT(HL) of a hyperlink HL into the microphone 17 as a command. The user of the computer 1 can also speak a command into the microphone 17, which command represents one of the search commands that can be recognized by the speech recognition device 9 and represents a search criterion to find Internet pages whose contents correspond to the search criterion. This will be further explained below with reference to the following examples of application.

The speech recognition device further includes receiving means 18 for receiving an audio signal AS of a user-uttered command applied to the audio port 16. The receiving means 18 include an input amplifier for amplifying the audio signal AS and an analog-to-digital converter for digitizing the analog audio signal AS. The receiving means 18 can produce digital audio data AD representing the command uttered by the user.

The speech recognition device 9 further includes speech recognition means 19 for detecting a phoneme sequence P corresponding to the spoken command and for detecting the hyperlink HL selected by the user by comparing the determined phoneme sequence P with the phoneme sequences P[HT(HL)] stored in the command word determining stage 14. For this purpose, the speech recognition means 19 include a speech recognition stage 20 and the command word determining stage 14.

The speech recognition stage 20 can be supplied with digital audio data AD which can be delivered by the receiving means 18. The speech recognition stage 20 is arranged for detecting the phoneme sequence P corresponding to the digital audio data AD of

the command spoken by the user, as this has already been known for a long time with speech recognition devices. A phoneme sequence P detected by the speech recognition stage 20 can be delivered by this stage to the command word determining stage 14.

The speech recognition stage 20 is further arranged for comparing the detected phoneme sequence P with phoneme sequences of recognizable search commands stored in the speech recognition stage 20. When a command spoken by the user represents a search command known to the search recognition stage 20 or contains same, the phoneme sequence detected by the speech recognition stage 20 for the search criterion following the search command in the spoken command can be delivered as a search phoneme sequence SP to the command determining stage 14.

After receiving a phoneme sequence P from the speech recognition stage 20, the command determining stage 14 is arranged for comparing the received phoneme sequence P with phoneme sequences P[HT(HL)] stored in the command table 15. The command determining stage 14 is further arranged for delivering the hyperlink HL Internet address URL(HL) stored in the command table 15, of which the hyperlink phoneme sequence P[HT(HL)] of the hypertext HT(HL) corresponds best to the phoneme sequence P delivered to the command determining stage 14.

The speech recognition device 9 further includes control means 21 for controlling the Internet browser 6 to enable reception of text information TI and picture information BI of the Internet page featured by the hyperlink HL selected by the user. For this purpose, the hyperlink HL Internet address URL(HL) determined by the command determining stage 14 can be applied to the control means 21. The control means 21 form an interface to the Internet browser 6 and deliver the Internet address URL(HL) of the selected hyperlink HL applied to the control means 21 to the Internet browser 6 in a data format so that the first computer program product can immediately process the Internet address URL.

This achieves that for selecting a hyperlink HL of the Internet page 8 shown on the monitor 5, a user can speak one of the text information signals TI3 to TI7 into the microphone 17 as a command and the Internet page featured by the Internet address URL(HL) of the selected hyperlink HL is automatically retrieved by the respective Internet server 2 or 3 and displayed by the monitor 5.

The speech recognition device 9 henceforth has search storage means 22 which store a first search table 23 shown in Fig. 4 and a second search table 24 shown in Fig. 5. In a first column of the search tables 23 and 24 are stored search criterion phoneme sequences KP(KT) of search criterions KT. For example, the search criterion phoneme

sequence KP(BOOKS) stored in the second row of the first search table 23 of the search criterion KT = "BOOKS" would correspond to the phoneme sequence P detected by the speech recognition stage 20, if the user spoke the word "BOOKS" into the microphone 17.

In a second column of the search tables 23 and 24 are stored one or more Internet addresses URL[KT(HL)] of Internet pages stored and assigned to the search criterion phoneme sequences KP(KT) contained in the first column, the contents of these Internet pages containing information that was assigned to the search criterion KT. In this manner, for example, an Internet address URL[BOOKS(1)] = http://www.amazone.com features an Internet page by which books can be searched for on the Internet NET. Similarly, for example, an Internet address URL[MUSIC(1)] = http://www.mtv.com stored in the search table 24 and assigned to the search criterion phoneme sequence KP(MUSIC) features an Internet page of the music channel MTV.

A third column of the search tables 23 and 24 contains hypertexts HT[KT(HL)] of hyperlinks HL assigned to a search criterion phoneme sequence KP(KT) when the search criterion phoneme sequence KP(KT) in the second column is assigned more than one Internet address URL[KT(HL)]. This will be further discussed with reference to a second example of application.

In accordance with a first example of application of the speech recognition method of selecting Internet pages it is assumed that the Internet page 8 is displayed by the monitor 5 and that the user of the computer 1 would like to receive information about books from the Internet NET. To achieve this, the user speaks the command "SEARCH BOOKS" into the microphone 17, after which a respective audio signal AS is delivered to the receiving means 18 and corresponding audio data AD are delivered to the speech recognition stage 20 by the receiving means 18.

The speech recognition stage 20 detects phoneme sequences P corresponding to the words "SEARCH" and "BOOKS" and compares the phoneme sequence P of the first word "SEARCH" to phoneme sequences of search commands that can be recognized and are stored in the speech recognition stage 20. The speech recognition stage 20 recognizes the first word of the spoken command as a search command and delivers the phoneme sequence P of the second word "BOOKS" as a search phoneme sequence SP to the command determining stage 14.

The command determining stage 14 is then arranged for comparing the search phoneme sequences SP delivered thereto with search criterion phoneme sequences KP(KT) contained in the first column of the first search table 23. The command determining stage 14

then determines that the search phoneme sequence SP largely matches the search criterion

phoneme sequence KP(BOOKS) stored in the second row of the first search table 23 and

reads the Internet address URL[BOOKS(1)] = http://www.amazon.com stored in the second

column of the second row of the first search table 23 and assigned to this search criterion

phoneme sequence KP(BOOKS) from the search storage means 22.

This Internet address URL[BOOKS(1)] = http://www.amazon.com is then

delivered to the control means 21 by the command determining stage 14. The control means

21 deliver this Internet address URL[BOOKS(1)] in the data format processed by the Internet

browser 6 as an Internet address URL = http://www.amazon.com to the Internet browser 6, as

a result of which the Internet page featured by this Internet address URL is displayed on the

monitor 5.

This achieves that the user only had to speak the command "SEARCH

BOOKS" into the microphone to obtain an Internet page with information about the search

criterion "BOOKS" on the monitor 5. Advantageously, it is not necessary for a corresponding

hyperlink HL to be contained in the Internet page 8 displayed on the monitor 5. This

advantage is particularly obtained in that the first search table 23 already stores Internet

addresses URL[KT(HL)] for certain search criteria KT and, therefore, need not first be

retrieved from the Internet NET with a so-called search engine (for example YAHOO).

A further advantage of the speech recognition method is provided in that the

provider of the first search table 23 forming a database may ask for a registration fee from

persons or businesses whose Internet address URL[KT(HL)] is to be registered in the first

search table 23 with a certain search criterion KT, as a result of which an economically

interesting method of doing business on the Internet is obtained.

Since Internet addresses URL relatively often change, it is advantageous to

continuously update the first search table 23. For this purpose the provider of the first search

table 23 uses a third computer server 25 which is connected to the Internet NET and by

which the first search table 23 respectively updated by the provider is stored. At certain

instants (for example, every week or each time a search command is recognized by the

speech recognition stage 20), the control means 21 deliver an Internet address URL featuring

the third computer server 25 to the Internet browser 6, after which the updated search table

23 is received by the Internet browser 6 and stored in the search storage means 22. This

updating of the first search table 23 may advantageously be effected automatically and

without the user of the computer 1 being involved.

This offers the advantage that the first search table 23 is continuously updated in all the computers running the second computer program product. Furthermore, the provider of the first search table 23 may also demand different registration fees for entering the Internet address URL[KT(HL)] from a person or business for different time ranges in the first search table 23.

According to the second example of embodiment of the speech recognition method of selecting Internet pages it is assumed that the Internet page 8 is displayed by the monitor 5 and the user of the computer 1 would like to have information about baby clothing from the Internet NET. For this purpose, the user speaks the command "SEARCH BABY CLOTHES" into the microphone 17, after which the speech recognition stage 20 – as described above – applies a phoneme sequence P corresponding to the search criterion "BABY CLOTHES" as a search phoneme sequence SP to the command determining stage 14.

The command determining stage 14 determines that the search criterion phoneme sequence KP(BABY CLOTHES) entered on the third line of the first search table 23 has a sufficiently large correspondence to the search phoneme sequence SP. Subsequently, the command determining stage 14 reads the four Internet addresses URL[BABY CLOTHES(1)] to URL[BABY CLOTHES(4)] and the four associated hypertexts HT[BABY CLOTHES(1)] to HT[BABY CLOTHES(4)] stored and assigned to the search criterion phoneme sequence KP(BABY CLOTHES) in the first search table 23 from the search storage means 22 and delivers this information to the control means 21.

The control means 21 then generate text information TI of an Internet index page 26 shown in Fig. 6 and apply this to the Internet browser 6 to be displayed on the monitor 5. Text information TI8 then indicates the search criterion KT entered as a search command by the user. Text information TI9 to TI12 forms hyperlinks HL to the Internet pages featured by the Internet addresses URL[BABY CLOTHES(1)] to URL[BABY CLOTHES(4)] with information about the search criterion "BABY CLOTHES", which hyperlinks can be activated by the user .

This offers the advantage that when more than one Internet addresses URL[KT(HL)] is registered for a search criterion KT in the search table 23 or 24, the Internet index page 26 is shown and the user, by activating the hyperlink HL of the Internet index page 26, can retrieve one Internet page with information about the search criterion KT after the other of an Internet server connected to the Internet NET.

According to a third example of application of the speech recognition method it is assumed that the user of the computer 1 would like to link the Internet page of a certain pizza service to the search criterion "PIZZA SERVICE" to find the page back rapidly. For this purpose, the user enters search criterion text information KTI = "PIZZA SERVICE" and

5   the assigned Internet address URL[PIZZA SERVICE(HL)] = http://www.pizza.com with the keys of the keyboard 7.

This information entered with the keyboard 7 is received by the correlation stage 12. The correlation stage 12 then determines for the received search criterion text information KT = "PIZZA SERVICE" an associated search criterion phoneme sequence

10   KP(PIZZA SERVICE) and applies this sequence together with the received Internet address URL[PIZZA SERVICE(HL)] to the search storage means 22.

In Fig. 7 is shown the second search table 24 in which, in addition to the second search table 24 shown in Fig. 5, the fifth row of the search criterion phoneme sequence KP(PIZZA SERVICE) and the Internet address URL[PIZZA SERVICE(HL)] =

15   http://www.pizza.com were entered. The search table 24 shown in Fig. 7 is then stored in the search storage means 22.

This advantageously achieves that the user of the computer 1 can also assign search criterions KT to Internet addresses URL of interest to himself and store them in the second search table 24. The first search table 23 is then provided by the provider of the

20   database and updated, in contrast to which the second search table 24 can be provided and updated continuously by the user of the computer 1 himself.

It may be observed that the user can also enter a plurality of Internet addresses URL[KT(HL)] and hypertexts HT(HL) of hyperlinks HL to the search criterion text information KT by using the keyboard 7. They are then also entered in the search table 24, as

25   this is represented in the third row of the search table 24 under the search criterion "VIDEO".

According to the fourth example of application of the speech recognition method, the user would like to order a pizza from his pizza service. For this purpose the user speaks the command "MY PIZZA SERVICE" into the microphone 17. The speech recognition stage 20 then compares the detected phoneme sequence P with phoneme

30   sequences of recognizable speech commands and recognizes the speech command "MY". Then the speech recognition stage 20 delivers the phoneme sequence P of the search criterion KT = "PIZZA SERVICE" as a specially featured search phoneme sequence SP to the command determining stage 14.

The command determining stage 14 compares specially featured search phoneme sequences SP only with search criterion phoneme sequences KP(KT) entered in the second search table 24, because the second search table 24 contains the search criterions KT and assigned Internet addresses URL[KT(HL)] entered by the user. Subsequently, the Internet addresses URL[KT(HL)] = http://www.pizza.com delivered to the control means 21 by the command determining stage 14 is delivered as an Internet address URL to the Internet browser 6, after which the desired Internet page of the pizza service for ordering a pizza is shown on the monitor 5.

This offers the advantage that the user, by selecting the search command "SEARCH" or "MY", can decide whether a search is to be made in the first search table 23 or in the second search table 24 for Internet addresses URL[KT(HL)] corresponding to the search criterion KT.

It may be observed that the user – for example by speaking the command "GO TO BABY CLOTHES" – can determine that only the Internet address URL[KT(3)] = http://www.baby.com of the Internet page stored in the first search table 23 for the search criterion KT is to be delivered to the control means 21 and displayed by the monitor 5, which Internet page was featured as the most interesting Internet page for this search criterion KT by the provider of the first search table 23.

For the user this brings in the advantage that, upon request (when he speaks "GO TO" and not "SEARCH" as a command) the user is specially pointed to the search criterion on a highly interesting Internet page. For the provider of the first search table 23 it is advantageous that he may ask an additional registration fee from persons or businesses whose Internet addresses URL[KT(HL)] are to be highlighted in the first search table 23.

According to a fifth example of application of the speech recognition method the user speaks the command "SEARCH PHOTOS" into the microphone 17. Subsequently, a search phoneme sequence SP of the search criterion "PHOTOS" detected by the speech recognition stage 20 is compared by the command determining stage 14 to search criterion phoneme sequences KP[KT(HL)] stored in the first search table 23. The command determining stage 14 then determines that none of the stored search criterion phoneme sequences KP[KT(HL)] has a sufficiently great correspondence to the search phoneme sequence SP. Search text information ST = "PHOTOS" detected by the speech recognition stage 20 is delivered by it to the command determining stage 14 and delivered by this stage to the control means 21.

When search text information ST is received, the control means 21 deliver an Internet address URL of a search engine (for example, URL = http://www.yahoo.com of the search engine YAHOO) stored by the control means 21 to the Internet browser 6. Subsequently, the control means 21 deliver the search text information ST to the Internet browser 6, which inserts the search text information ST into the entry field of the Internet page of YAHOO and activates the search with the search engine "YAHOO". The YAHOO search engine then finds Internet pages to be assigned to the search criterion PHOTOS and a respective Internet index page is displayed on the picture screen 5.

This offers the advantage that when for a search criterion KT of a spoken search command no search criterion phoneme sequence KP[KT(HL)] is stored in the search table 23 or 24, the search for Internet pages containing information about this search criterion KT is transferred to a search engine.

According to a second example of embodiment not shown in the Figures of the speech recognition method, the first search table 23 is not stored, as explained with reference to the first example of application, in the second computer program product, thus in the search storage means 22 of the computer 1, and continuously updated. When a user speaks a command into the microphone, the Internet address URL of the third computer server 25 stored in the control means of the second computer program product and, subsequently, the detected search phoneme sequence SP of the search criterion KT is delivered to the Internet browser 6 which delivers the search phoneme sequence SP to the third computer server 25 via the Internet NET.

According to the second example of embodiment the third computer server 25 comprises means corresponding to the command determining stage 14 and the search storage means 22 of the computer 1. The third computer server 25 executes a selection method of selecting Internet addresses URL[KT(HL)] of Internet pages assigned to a search criterion KT. A search phoneme sequence SP sent via the Internet NET to the third computer server 25 is received by the third computer server 25.

Subsequently, the third computer server 25 detects from a search table stored in the third computer server 25 a search criterion phoneme sequence KP(KT) that has a sufficiently large correspondence to the received search phoneme sequence SP and detects at least one Internet address URL[(KT(HL)] stored and assigned to this search criterion phoneme sequence KP(KT). These one or more Internet addresses URL[KT(HL)] detected by the third computer server 25 via the search criterion KT are then delivered to the computer

by the third computer sever 25, by which computer the search phoneme sequence SP is received.

This offers the advantage that the search table, which may need a large memory capacity, need not be stored in each computer that runs the second computer program product. In addition, there is no longer a must to continuously update the search table in these computers.

When the speech recognition method is subdivided – as described with reference to the second example of embodiment – into a part to be processed by the computer (client) of the user and a part to be processed by the computer server, in which phonemes or information corresponding to the phonemes are transmitted from the client to the server, there are two essential advantages. The speaker-dependent processing operations of the speech recognition method are processed at the client's, so that the server advantageously need not process speaker-dependent information. Furthermore, all processing operations that cost much memory space are uniformly processed by the server, so that the computers (clients) of the user advantageously need not have much memory capacity.

It may be observed that the second computer program product can be loaded from a CD-ROM or a floppy disc into the internal memory of the computer 1 and thus, advantageously, can be installed in the computer 1 in an extremely simple manner.

It may be observed that the speech recognition method and the second computer program product can be implemented and processed respectively by any product that can be connected to the Internet NET. Such products may be, for example, a personal digital assistant, a set top box or a mobile telephone, which can set up a connection to the Internet.

It may be observed that determining whether a phoneme sequence P has a sufficiently large correspondence to another phoneme sequence is a routine job for the expert.

It may be observed that when the hypertext HT(HL) of a hyperlink HL of an Internet page displayed by the monitor 5 contains the same text information as a search command that can be detected by the speech recognition stage 20 together with the subsequent search criterion KT, the hyperlink HL of the Internet page can be activated, for example, by speaking a command "CLICK" before the hypertext HT(HL) is spoken.

It may be observed that the second computer program product may also form part of the first computer program product – thus part of the Internet browser.

It may be observed that all the measures explained in connection with the Internet can equally well be applied to any data networks.

CLAIMS:

1.   A speech recognition method of selecting Internet addresses (URL[KT(HL)])

of Internet pages (8) assigned to a search criterion (KT), the method comprising the

following steps:

reception (18) of a spoken command (AS) of a user, which represents a search command and

5   a search criterion (KT) and

determining (20) a search phoneme sequence (SP) corresponding to the search criterion (KT)

of the spoken command (AS) and

determining (14) a search criterion phoneme sequence (KP(KT)) which has a sufficiently

large correspondence to the search phoneme sequence (SP) from stored (22; 25) search

10   criterion phoneme sequences (KP(KT)) of search criterions (KT) and

determining (14) at least one of the Internet addresses (URL[KT(HL)]) of at least one

Internet page assigned to the search criterion (KT) which stored address is assigned to the

determined search criterion phoneme sequence (KP(KT)) and

displaying (5) this at least one assigned Internet page.

15

2.   A speech recognition method as claimed in claim 1, in which, when at least

two Internet addresses (URL[KT(HL)]) of the determined search criterion phoneme sequence

(KP(KT)) are assignedly stored, the display (5) of an Internet index page (26) is effected in

which hypertexts (HT[KT(HL)]) stored and assigned to the determined Internet addresses

20   (URL[KT(HL)]) are represented by hyperlinks (HL) so as to provide that the user by

activating one of these hyperlinks (HL) effects the display (5) of an Internet page selected by

the user and to be assigned to the search criterion (KT).

3.   A speech recognition method as claimed in claim 1, in which the method

25   comprises the following further steps:

retrieving (21) at least one search criterion phoneme sequence (KP(KT)) and at least one

assigned Internet address (URL[KT(HL)]) of at least one Internet page assigned to a search

criterion (KT) by a computer server (25) connected to the Internet (net) and

storing (22) the retrieved search criterion phoneme sequences (KP(KT)) and assigned

Internet addresses (URL[KT(HL)]) for executing the steps of the speech recognition method.

4.   A speech recognition method as claimed in claim 1, in which the method

comprises the following further steps:

receiving (12) search criterion text information (KTI) and at least one assigned Internet

address (URL[KT(HL)]) and

determining (12) a search criterion phoneme sequence (KP(KT)) corresponding to the search

criterion text information (KTI) and

storing (22) the determined search criterion phoneme sequence (KP(KT)) and the received

Internet addresses (URL[KT(HL)]) for executing the steps of the speech recognition method.

5.   A speech recognition method as claimed in claim 1, in which when none of the

stored search criterion phoneme sequences (KP[KT(HL)]) has a sufficiently large

correspondence to the search phoneme sequence (SP), search text information (ST) about the

search criterion (KT) of the spoken command is determined (20) and delivered to a computer

server (25) connected to the Internet (NET), by which server a computer program product (6)

of a search engine is processed, to enable the display of an Internet index page (5) containing

hypertexts (HT(HL)) of hyperlinks (HL) detected by the search engine.

6.   A speech recognition method as claimed in claim 1, in which the method

comprises the following further steps:

transmitting (21) the determined phoneme sequence (SP) to an Internet server (25), which is

featured by an Internet address (URL) predefined by the search command, and

determining from search criterion phoneme sequences (KP[KT(HL)]) stored by the Internet

server (25) a search criterion phoneme sequence (KP[KT(HL)]) that has a sufficiently large

correspondence to the search phoneme sequence (SP) and

determining at least one of the determined search criterion phoneme sequences

(KP[KT(HL)]) having the Internet address (URL[HT(HL)]) stored and assigned to the

Internet server (25) from an Internet page assigned to at least one of the search criterions

(KT) and

displaying this at least one assigned Internet page.

7.   A speech recognition method as claimed in claim 1, in which the method comprises the following further steps:

laying down (20) a selection of the stored search criterion phoneme sequences (KP(KT)) to determine the correspondence with the search phone sequence (SP) by comparing the search

5   command of the user with possible search commands.

8.   A computer program product (9) which can be directly loaded into the internal memory of a digital computer (1) and comprises software code sections, characterized in that with the computer (1) the steps of the method are executed in accordance with claim 1 when

10   the product (9) runs on the computer (1).

9.   A computer program product (9) as claimed in claim 8, characterized in that it is stored on a medium that can be read by the computer.

15   10.   A selection method of selecting Internet addresses (URL[KT(HL)]) of Internet pages (8) assigned to a search criterion (KT), the method comprising the following steps:

receiving a search phoneme sequence (SP) which represents a search criterion (KT) of a spoken command (AS) of a user and

determining from stored (25) search criterion phoneme sequences (KP(KT)) of search

20   criterions (KT) a search criterion phoneme sequence (KP(KT)) that has a sufficiently large correspondence to the search phoneme sequence (SP) and

determining at least one stored Internet address (URL[KT(HL)]) assigned to the determined search criterion phoneme sequence (KP(KT)) of at least one Internet page assigned to the search criterion and

25   producing the at least one determined Internet address (URL[KT(HL)]) to enable a display (5) of this at least one assigned Internet page.
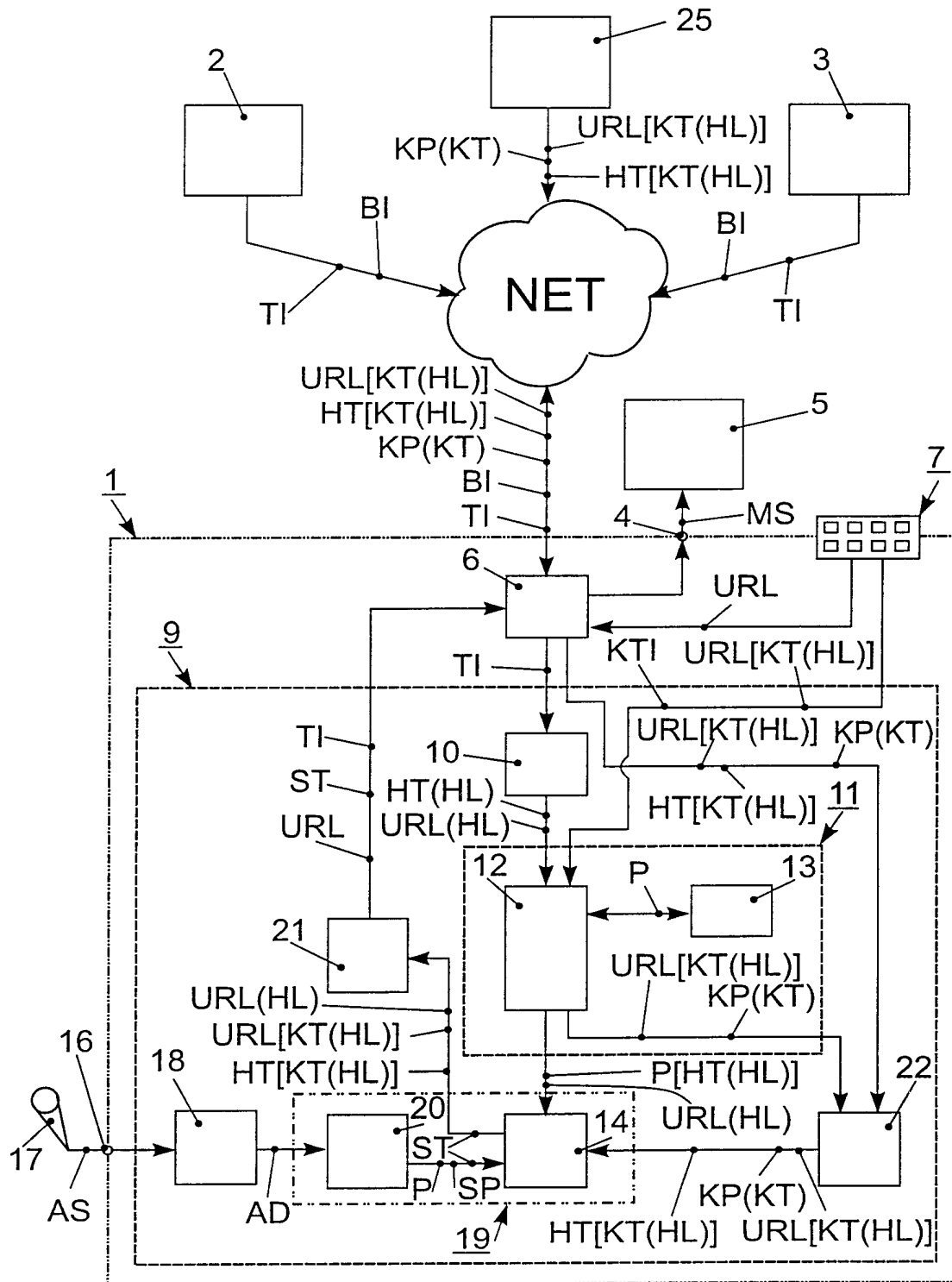
1/3

FIG. 1

2/3

PHILIPS SPEECH PROCESSING ← TI1

PHILIPS PROVIDES SPEECH
PROCESSING SOFTWARE AND ← TI2
A SPEECHMIKE

TI3 → <u>PRODUCT INFORMATION</u>

TI4 → <u>PURCHASE INFORMATION</u>

TI5 → <u>SPEECHMIKE LFH 6175</u>

TI6 → <u>ENTWICKLUNGSSTANDORT ÖSTERREICH</u>

TI7 → <u>PARLER COURAMMENT FRANÇAIS</u>

8

FIG. 2

P[HT(HL)]	URL(HL)
P(1)	http://www.philips.product.com
P(2)	http://www.philips.purchase.com
P(3)	http://www.philips.speechmike.com
P(4)	http://www.philips.development.com
P(5)	http://www.philips.speech.fr

FIG. 3

15

KP(KT)	URL[KT(HL)]	HT[KT(HL)]
KP(BOOKS)	http://www.amazon.com	
KP(BABY CLOTHES)	http://www.childrensmall.com http://www.childrencloth.com http://www.baby.com http://www.clothes.com	CHILDREN(1) CHLOTHES FOR KIDS(2) ALL FOR BABIES(3) CHLOTHES FORYOU(4)
KP(VIDEORECORDER)	http://www.philips.video.com http://www.sony.products.com http://www.jvc.vcr.com	PHILIPS VIDEO(1) SONY CE-PRODUCTS(2) JVC VIDEORECORDER(3)
KP(MUSIC)	http://www.mp3.com	
...	...	...

FIG. 4

23

KP(KT)	URL[KT(HL)]	HT[KT(HL)]
KP(BOOKS)	http://www.goodbook.com	
KP(VIDEOS)	http://www.video.com http://www.rentavideo.com	VIDEOSHOP RENT A VIDEO
KP(MUSIC)	http://www.mtv.com	

FIG. 5

24

YOUR SEARCH RESULT FOR

"BABY CLOTHES" ← TI8

TI9 → CHILDREN

TI10 → CHLOTHES FOR KIDS

TI11 → ALL FOR BABIES

TI12 → CLOTHES FOR YOU

26

FIG. 6

KP(KT)	URL[KT(HL)]	HT[KT(HL)]
KP(BOOKS)	http://www.goodbook.com	
KP(VIDEOS)	http://www.video.com http://www.rentavideo.com	VIDEOSHOP RENT A VIDEO
KP(MUSIC)	http://www.mtv.com	
KP(PIZZA SERVICE)	http://www.pizza.com	

FIG. 7

24

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G10L15/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G10L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 50830 A (MICROSOFT CORP) 7 October 1999 (1999-10-07) abstract	1-5,7-10
Y	page 7, line 1-31 ---	6
Y	US 5 960 399 A (BARCLAY ET AL) 28 September 1999 (1999-09-28) abstract --- -/--	6

[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 February 2001	22/02/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Quélavoine, R

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INTERNATIONAL SEARCH REPORT

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	LAU R ET AL: "WebGALAXY: beyond point and click -- a conversational interface to a browser" COMPUTER NETWORKS AND ISDN SYSTEMS,NL,NORTH HOLLAND PUBLISHING. AMSTERDAM, vol. 29, no. 8-13, 1 September 1997 (1997-09-01), pages 1385-1393, XP004095333 ISSN: 0169-7552 the whole document	1-5,7-10
A	DATABASE INSPEC 'Online! INSTITUTE OF ELECTRICAL ENGINEERS, STEVENAGE, GB; KATSUURA M ET AL: "The WWW browser system with spoken keyword recognition" Database accession no. 6264744 XP002160022 abstract & TRANSACTIONS OF THE INFORMATION PROCESSING SOCIETY OF JAPAN, FEB. 1999, INF. PROCESS. SOC. JAPAN, JAPAN, vol. 40, no. 2, pages 443-452, ISSN: 0387-5806	1-10

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 9950830	A	07-10-1999	EP	1066625 A	10-01-2001
US 5960399	A	28-09-1999	NONE		